

**REMARKS:**

Claims 1-20 are currently pending in the application. Claims 3, 4, 13, and 14 stand rejected under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claims 1, 3-11, and 13-20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,439,082 (*McKeown*). Claims 2 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *McKeown* in view of U.S. Patent No. 4,811,919 (*Jones*).

**Rejections Under 35 U.S.C. § 112:**

Claims 3, 4, 13, and 14 stand rejected under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Examiner states that the phrase "the damping valve" is indefinite.

Claims 3, 4, 13, and 14 are hereby amended to more particularly point out and distinctly claim the subject matter that the Applicants regard as the invention. The Applicants submit that the amendments to Claims 3, 4, 13, and 14 overcome the Examiner's rejections under 35 U.S.C. § 112, and that Claims 3, 4, 13, and 14, as amended, are now in condition for allowance. Therefore, the Applicants respectfully request that Claims 3, 4, 13, and 14, as amended, be allowed.

**Rejections Under 35 U.S.C. § 102(b):**

Claims 1, 3-11, and 13-20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *McKeown*.

With respect to Claims 1, 3-5, and 20, the Examiner states that *McKeown* shows a damper having an adjustable spring rate. The Examiner states that *McKeown* comprises a selectively switchable valve 33, 67, 69 for controlling a fluid flow from one of the chambers to the other through the primary passage. The Applicants respectfully disagree.

*McKeown* discloses a hydraulic vibration isolator that includes, among other features: a cylinder with two chambers filled with an incompressible fluid; a piston between the two chambers; three channels disposed within the piston; and, a solid tuning slug (i.e., a metallic rod) that freely slides within a channel for attenuating vibration (see Figure 2). Elastomeric members attach the piston to the cylinder and damp excessive tuning slug motion. An electronic control system supplies an alternating current to control the tuning slug's movement. The Applicants respectfully submit that the *McKeown* tuning slug is not a "selectively switchable valve."

In contrast, the claimed invention differs from *McKeown* in at least the following ways: (1) the claimed invention is a damper system; whereas, *McKeown*'s device is a vibration isolator; (2) the claimed invention's channels 87, 89 serve different functions than *McKeown*'s channels 39, 41; and (3) the claimed invention is a dual spring rate damper capable of changing spring rates from  $k_{\text{bulge}}$  to  $k_{\text{shear}}$ , and vice-versa; whereas, the spring rate in *McKeown*'s device remains constant.

First, a person skilled in the art at the time of the invention understands that a damper system and a vibration isolator system attenuate vibrations in different ways. To assist in understanding the differences between the two devices, the following spring-force equation is used:

$$F = m \ddot{x} + c \dot{x} + kx$$

A vibration isolator utilizes inertial forces  $m \ddot{x}$  (i.e., momentum) to cancel elastic forces  $kx$  (tendency for a spring to return to its natural length), while a damping device is concerned with utilizing dissipative effects  $c \dot{x}$  (viscous effects) to remove energy from a vibrating system. *McKeown*'s device is a vibration isolator system that actively controls inertial forces with a tuning slug. In *McKeown*, the alternating difference in liquid pressure in the chambers "acts to accelerate the tuning slug 33 upwardly and downwardly within the tuning passage 31." (Column 4, lines 5-7). *McKeown* teaches that "the acceleration of the tuning slug 33 caused by the difference in liquid pressures in the chambers 35, 37 produces an inertial force opposing the acceleration." (Column 4, lines 17-19). As

discussed above, a vibration isolator utilizes inertial forces (the tuning slug system) to cancel elastic forces (chamber liquid pressures); whereas, the claimed dual damper device utilizes elastomeric seals to remove energy from the vibrating system.

Second, in the claimed invention, channels 87, 89 extend through the piston for communicating with the fluid chambers on opposing sides of the piston (see Fig. 6 of the claimed invention). Fluid from each chamber passes through channels 87, 89 with movement of post 53. The claimed invention incorporates a passage valve that opens and closes channel 87. When one of the two channels is closed, the damper spring constant changes from  $k_{\text{shear}}$  to  $k_{\text{bulge}}$ , and vice-versa when opened. In comparison, *McKeown's* channels 39, 41 serve solely as ancillary bypass passages and "act to decrease or eliminate tuning slug overtravel when the vibration isolator 1 is exposed to large amplitude vibration and/or vibration at frequencies near the natural frequency,  $f_n$ , of the system." (Column 5, lines 36-39). *McKeown's* channels do not incorporate a passage valve within the channels themselves for fluid control (see Figure 2 of *McKeown*). In addition, the *McKeown* channels do not change the damper's spring constant.

Third, the claimed invention is a "dual spring rate damper" capable of changing spring rate constants from  $k_{\text{bulge}}$  to  $k_{\text{shear}}$ , and vice-versa, by opening and closing a passage valve. As shown in Figure 6 and 7 of the subject application,  $k_{\text{shear}}$  is created when both channels 87, 89 remain open, and  $k_{\text{bulge}}$  is created when channel 87 is closed. As explained in the subject application, "[t]he advantage of selectable in-plane stiffness is that hub 11 can be made stiff enough to prevent ground-resonance conditions when the aircraft is resting on a surface, yet hub 11 can be made softer during flight for minimizing loads and fatigues on components of hub 11 and other components of the aircraft." (Page 4, lines 12-15). In comparison, *McKeown* does not disclose changing the spring constant. For at least these reasons, the Applicants submit that the claimed invention is not anticipated by *McKeown*.

Claims 1, 3-5, and 20 are not hereby amended. The Applicants submit that the foregoing remarks traverse the Examiner's rejections under 35 U.S.C. § 102(b), and that

the claimed invention is not anticipated by *McKeown*. As such, the Applicants respectfully request that Claim 1, 3-5, and 20 be allowed.

With respect to Claims 6-9, 11, and 13-18, the Examiner states that *McKeown* discloses a damper comprising a secondary passage communicating with the fluid chambers. The Applicants respectfully disagree.

The Applicants reiterate here the distinguishing remarks set forth above with respect to *McKeown*. In the claimed invention, the channels are used to change the damper's spring constant from  $k_{bulge}$  to  $k_{shear}$ , and vice-versa; whereas, *McKeown*'s channels serve as ancillary bypass passages. *McKeown*'s channels "act to decrease or eliminate tuning slug overtravel when the vibration isolator 1 is exposed to large amplitude vibration and/or vibration at frequencies near the natural frequency,  $f_n$ , of the system." (Column 5, lines 36-39). For at least these reasons, the Applicants submit that the claimed invention is not anticipated by *McKeown*.

Claims 6-9, 11, and 13-18 are not hereby amended. The Applicants submit that the foregoing remarks traverse the Examiner's rejections under 35 U.S.C. § 102(b), and that the claimed invention is not anticipated by *McKeown*. As such, the Applicants respectfully request that Claims 6-9, 11, and 13-18 be allowed.

With respect to Claims 10 and 19, the Examiner states that *McKeown* discloses a bypass valve located within the bypass passage. The Applicants respectfully disagree.

The Applicants reiterate here the distinguishing remarks set forth above with respect to *McKeown*. In particular, channel 87 of the subject application is opened and closed with valve 99, thereby changing the spring constant from  $k_{bulge}$  to  $k_{shear}$ , and vice-versa; whereas, *McKeown*'s valve is a one-way valve located at the channel's exit and used to prevent backflow of chamber fluid. For at least these reasons, the Applicants submit that the claimed invention is not anticipated by *McKeown*.

Claims 10 and 19 are not hereby amended; however, Claims 10 and 19 remain dependent upon Claims 1 and 11, respectively. The Applicants submit that the foregoing

remarks traverse the Examiner's rejections under 35 U.S.C. § 102(b), and that the claimed invention is not anticipated by *McKeown*. Moreover, because Claims 10 and 19 are dependent upon and further limit allowable base claims, the Applicants submit that Claims 10 and 19 are also allowable. Therefore, the Applicants respectfully request that Claims 10 and 19 be allowed.

**Rejections Under 35 U.S.C. § 103(a):**

Claims 2 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *McKeown* in view of *Jones*.

With respect to Claims 2 and 12, the Examiner states that *McKeown* describes the invention "substantially" as set forth above, but concedes that *McKeown* is silent with regard to the elastomeric seals being of layers of elastomeric material and a rigid non-elastomeric material. The Examiner relies on *Jones* to teach this feature. The Examiner states that it would have been obvious to one skilled in the art at the time of the invention to combine *McKeown* with *Jones* to arrive at the claimed invention. The Applicants respectfully disagree.

The Applicants reiterate the distinguishing features between *McKeown* and the claimed invention. In particular: (1) the claimed invention is a damper system; whereas, *McKeown*'s device is a vibration isolator; (2) the claimed invention's channels 87, 89 serve different functions than *McKeown*'s channels 39, 41; and (3) the claimed invention is a dual spring rate damper capable of changing spring rates from  $k_{bulge}$  to  $k_{shear}$ , and vice-versa; whereas, the spring rate in *McKeown*'s device remains constant.

*Jones* relates to fluid-filled mounts for aircraft engines. The mounts incorporate a laminated elastomeric element which "includes a series of alternating layers of elastic and inelastic, or non-extensible, material, such as the rubber layers 35a, 35b, bonded to metal layers, or shims, 35c, 35d, 35e ... ." (Column 4, line 67 – Column 5, line 3). *Jones* teaches that "[t]he laminated elastomeric elements 35 and 36 are designed primarily to carry static loads." (Column 5, lines 12-14). On the other hand, the claimed seals are not designed to carry static loads, but designed to carry shearing and bulging loads (see

Figures 6 and 7). As such, *Jones* teaches away from the claimed invention. For at least these reasons, the Applicants submit that it would not have been obvious to a person of ordinary skill in the art at the time of the invention with knowledge of *McKeown* and *Jones* to arrive at the claimed invention.

Claims 2 and 12 are not hereby amended, however, Claims 2 and 12 remain dependent upon Claims 1 and 11, respectively. The Applicants submit that the foregoing remarks traverse the Examiner's rejections under 35 U.S.C. § 103(a), and that the claimed invention is not rendered obvious in by *McKeown*, *Jones*, or the combination thereof. Moreover, because Claims 2 and 12 are dependent upon and further limit allowable base claims, the Applicants submit that Claims 2 and 12 are also allowable. Therefore, the Applicants respectfully request that Claims 2 and 12 be allowed.

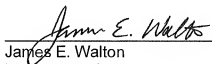
**CONCLUSION:**

This Amendment is being filed via the U.S. Patent and Trademark Office's EFS-Web electronic filing system. No fees are deemed to be necessary; however, the undersigned hereby authorizes the Commissioner to charge any fees which may be required, or credit any overpayments, to **Deposit Account No. 502806**.

Respectfully submitted,

Date

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